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The Importance of Interstate Highways to Economic Development in Nebraska

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This chapter focuses on one aspect of economic growth: the post-construction effect of interstate highways on income and sales expansion. Using data for all Nebraska and Iowa counties, interstate highways are found to have the most positive economic impact on areas with larger populations; small areas are not likely to experience much more than short-term gains. This finding has significant implications for the planned construction of a north-south, four-lane highway in Nebraska. The route of such a highway should be selected only after a careful look at the ability of local areas to capitalize on highway-induced growth impulses.

Introduction

In recent years Nebraska has examined its economic future with particular emphasis on strengthening its nonagricultural sectors. It is generally accepted that, while agriculture has contributed extensively to the state's prosperity, Nebraska's future economic performance will be strengthened by a balance among the various economic sectors. There is also increased recognition that the geographic distribution of growth has not been uniform over the past twenty years. Nebraska's larger cities have shown better economic performance than have smaller communities and rural areas. This has resulted in both urban-rural disparities and uneven concentrations of economic strength in the state. Even more troubling to many Nebraskans is the realization that the state is seriously trailing national averages for many of the standard indicators of economic health.

Since 1980, the term *economic development* has been a priority among virtually every citizen and business group in the state. At the local level, economic development efforts have typically focused on generating jobs and creating or revitalizing local economic development organizations. In a

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number of areas, several counties and communities have joined together to promote economic advancement on a regional basis.

At the state level, members of the Unicameral established subcommittees to examine the issues. Economic development terminology crept into many legislative actions, special legislation was advanced, and economic development became the focal point, if not the keystone, of both the Nebraska legislature and the governor's agenda during the mid-1980s. More recently, a study backed by the Nebraska Press Association-Peter Kiewit Foundation, *New Seeds for Nebraska*, has contributed to the dialogue about Nebraska's economic future.

There is reason to question the data and analysis used to advance what amounts to at least a $50 million program. Perhaps more disturbing is that so many hopes about the economic future of the state and local communities have come to rest on a singular event.

One of the most-discussed aspects of Nebraska's economic development was the thesis that economic performance in the state was strongest in the Fishhook: the communities along Interstate 80 and in the Platte River Valley communities of Fremont, Norfolk, and Columbus. (If this pattern is plotted on a map it gives the appearance of a fishhook, thus the name.) The conclusion was that Interstate 80 was an important factor to the economic development of Nebraska. This correlation seemed so evident that the legislature mandated the construction of at least one additional four-lane highway (State of Nebraska 1988). The main purpose of the legislation was to provide an economic initiative for the region served by the new highway.

As this idea was being discussed in late 1987, few challenged either the accuracy of these ideas or the information upon which such decisions were made. While the intentions were admirable, there is reason to question the data and analysis used to advance what amounts to at least a $50 million program. Perhaps more disturbing is that so many hopes about the economic future of the state and local communities have come to rest on a singular event.

This chapter provides information to enhance the dialogue and actions concerning four-lane and interstate highways and economic development in Nebraska. County-level data from Nebraska and Iowa are used to analyze economic performance among counties in order to determine whether growth was influenced by the presence or absence of an interstate highway.

Although the analysis finds a link between interstate highways and county economic performance, the relationship is strongest in more populated counties where an adequate social, economic, and physical infrastructure exists to take advantage of growth impulses resulting from an interstate.

The chapter begins with a brief review of what is known about highways and economic development. Next, economic development is defined. Non-interstate highway factors that might influence local economic performance are then profiled. The chapter next presents major findings drawn from descriptive and regression analyses of highway and nonhighway factors influencing county economic performance from 1956 to 1986. Implications for current efforts focusing on the development of a north-south expressway in Nebraska are highlighted in the final section.

Interstate Highways and Economic Development

Although the link between interstate highways and economic development has been the subject of a number of studies, these studies have used conflicting methods and measures (Briggs 1981). Perhaps most important, few use nonemployment-based measures of economic performance.

Moon's 1987 study is one of the more useful because he studied the effects of interstate exchanges on economic development as measured by the number of commercial, industrial, and residential structures in the immediate area. He concludes that the exchanges produce improvements.

In their study, Stephanedes and Eagle (1987) found that counties classified as economic centers experienced positive growth in employment when highway expenditures were increased. These findings are similar to those of Wang, Peterson, and Schofer (1975), who found that developing urban areas benefited from interstate highways.

Other studies have found that the interstate highway system can improve labor mobility, thereby changing the economic performance of counties based upon employment patterns. Wilson, Graham, and Aboul-Ela (1985), in their study in New Brunswick, Canada, found that while the highway system could not explain differences in general economic development, there was a relationship between highway completions and commuting patterns. These findings are consistent with the arguments offered by the Congressional Budget Office: improved transportation between two communities increases the available labor pool in the communities and may attract employers to an area (Stephanedes 1985).

The studies cited above show that a major issue concerning interstate highways and economic development is exactly what kind of economic changes interstate highways bring. Deen's study (1966) included variables such as sales tax, origin of vehicle, gross receipts, and labor mobility. Bardwell and Merry (1960) used sales tax collections as the basis for compar-

ing economic activity. Stephanedes (1985) identifies an input-output model to measure highways' effects and included the following elements: forecast of employment, wages, income, and consumer price index. Moon (1987) and Wang, Peterson, and Schofer (1975) included population as a factor.

The working assumption of the chapter is that economic and population growth will be greatest in the counties with interstate highway exchanges, second greatest in the counties that are contiguous to counties with interstate exchanges, and slowest in counties that are noncontiguous – farthest from the interstate highways.

The methodology underlying the research in this chapter was influenced strongly by Farmer and Pigman (1974). They focused on purchasing power and improvements in lifestyle in their research. Still, it can be reasonably asked whether a focus on employment change would be just as good, particularly because interstate highways appear to increase labor mobility and commuting. At first, it was unclear how to correctly build labor mobility and commuting into the research for this chapter. However, when the final analysis was completed using income, population and retail sales, these concerns dissipated. First, commuting of labor, regardless of the county of employment, would be reflected in these economic indicators because income and population are reported by county of residence and retail sales are reported by county of collection. While commuting might have increased, it would be an intermediate factor and not affect where those people lived, their incomes, or the associated retail performance, which is a function of where people spend their money for goods and services. Thus, while the procedures might in the first instance appear overly simplistic, they actually are more specific and measure more exactly the economic performance of an area than do other models that use employment change — an intermediate stage of performance.

Defining and Measuring Economic Development

The research reported in this chapter was guided by two distinctive but critical demands: to develop an acceptable definition of economic development and to establish a methodology for assessing the changes and comparing the economic development associated with the placement of interstate

highways. The working assumption of the chapter is that economic and population growth will be greatest in the counties with interstate highway exchanges, second greatest in the counties that are contiguous to counties with interstate exchanges, and slowest in counties that are noncontiguous—farthest from the interstate highways.

The first task was to establish an acceptable definition of economic development. Much of the economic development literature refers to the developing areas of the world and uses measures such as literacy, infant mortality, and level of education. While such information provides insights about the condition of the population, it does not adequately describe economic performance.

In the American literature on economic development, there has been a dependency on measures of manufacturing and industrial balance, enhancement of tax structures, and levels of employment/unemployment. While these are valuable indicators for assessing the composite economic structure, they are intermediate and not ultimate measures of economic development. For example, the development of many small manufacturers of old technology, which create jobs that pay minimum wages, might be measured as positive economic development. In reality, though, it may not increase wages or standards of living.

Economic development, then, should be measured and appreciated as it improves the general economic well-being of the population of a given area. Furthermore, economic development is a relative concept; economic improvement takes place at varying rates across different geographic areas.

Thus, economic development can best be defined by the prosperity and incomes of the people and institutions within a community. In this chapter, three general measures are used:

- Population — Population is linked to economic growth because people follow employment opportunities. The lack of these opportunities will cause people to seek them elsewhere. People can and do commute between communities, but the distance they are willing to travel is limited. Some people seek retirement locations without considering employment opportunities, but then these retirement locations generate employment opportunities for others.

- Income— Income is a measure of value being contributed by a labor force. People are paid according to what they contribute to the economic system. Some industries traditionally pay higher wages, partly because they make greater economic contributions and possibly because of the need to attract labor. Income, as an aggregate factor, reflects the number of individuals who are employed and at what level they are employed. Aggregate income reflects adjustments for the

rates of labor force participation, employment/unemployment patterns, and the size of the labor force. While income does not describe adequately where differences in economic performance occur, it distinguishes between the performances of smaller areas, such as counties.

- Retail sales — Institutional performance must be measured in economic terms. Retail sales measures the level of economic performance of an area, the attractiveness of the area, and its ability to retain consumers. If people are not willing to make their retail purchases in local stores, then the future economic performance of the retail sector is limited.

Beyond population, the specific indicators used in the analysis are: Effective Buying Income (EBI), retail sales, and Buying Price Index (BPI).[1] Each of these measures represents a different aspect of economic development. While EBI represents purchasing power, it also reflects the level of employment. However, as was argued earlier, it is superior to a measure of employment alone because it shows how salaries and employment increase. For example, a farm operator's spouse who takes a low-paying job to help make ends meet would be measured as an increase in employment, although income in that farm household might increase very little. EBI would give a truer picture of this household's condition.

Economic development should be measured and appreciated as it improves the general economic well-being of the population of a given area.

Retail sales measures the most important aspect of economic exchange in a county and capture the cash/goods relationship for sales ranging from farm equipment to furniture and groceries. BPI is a composite index and also measures purchasing potential.

These measures have been used consistently since the 1930s by the editors of *Sales and Marketing Management* to compare the economic performance of the cities and communities of the United States. Planners who are responsible for making decisions about store and market locations rely on this information to advertise, move merchandise, build stores, and make commitments based upon the expected performance of various geographic areas.

Analyzing Interstate Highway Economic Development Linkages

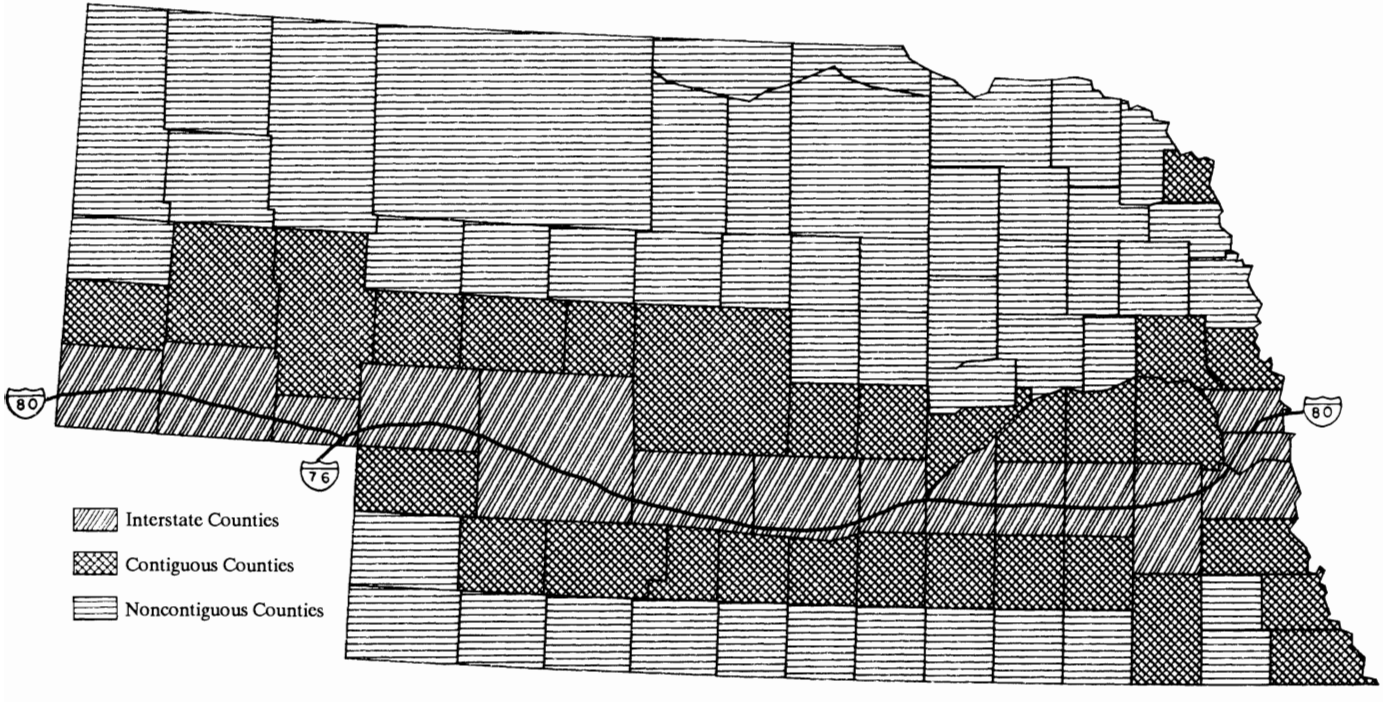
Proponents of highways argue that counties with interstate exchanges experience higher rates of growth in income, retail sales, and population than do counties without exchanges. To accurately assess these relationships, however, requires that the potential influence of other factors also be considered. In addition to information on whether a county has an interstate exchange, is contiguous to an interstate county, or is noncontiguous to an interstate county, the following factors are also considered, in varying combinations, in the analysis: population, number of households, percent of population aged 18-34 years, and percent of population 50 years and older.[2]

The interstate exchange designation is central to the study. The contiguous county designation is included because of the need to measure the possible positive economic effects of being adjacent to a county containing an interstate exchange. Being adjacent to a county with an interstate highway exchange may foster economic growth because of proximity to the highway. Noncontiguous counties should receive fewer benefits, given their greater distance from the highway. Figures 1 and 2 show the interstate, contiguous, and noncontiguous counties in Nebraska and Iowa.

The two age categories — percentage of the population aged 18-34 and percentage 50 and older — represent the labor force potential in the county. A higher proportion of 18 to 34-year-olds indicates a greater work force potential, while a higher proportion of people 50 and older represents a lower work force potential. The population aged 18-34 is also more likely to migrate and is therefore the most rapidly declining segment of the population in rural counties.

The population and household variables represent two related concepts. The first concerns the need for a county to have a critical mass of persons in order to experience economic growth. In other words, without potential purchasers, completion of an interstate highway through a county may have little economic impact. Second, population and household size partially reflect the existence and need for economic entities. Without a minimum population and household base, certain basic businesses (for example, a bank or a grocery store) may not be able to remain viable. Furthermore, many public services cannot be maintained. If these basic services do not exist, growth will be diverted to communities where such services are present. It is the loss or lower level of social and economic infrastructure that has made both reversing population decline and increasing economic activity so difficult in many rural counties.

Figure 1 - Nebraska Counties and their Proximities to Interstates



For reference map with county names, see page xiii.

Figure 2 - Iowa Counties and their Proximities to Interstates

For reference map with county names, see page xiv.

Impact of the Interstate Highway on Economic Development

The assessment of interstate highway impacts on economic development is both descriptive and analytic. Initially, three types of counties are profiled here: those with interstate highways, those contiguous to counties with interstate highways but containing none themselves, and those that neither contain interstate highways nor lie contiguous to counties that do. The

While the median population of the interstate counties grew during 1958-86 (although there was a slight dip from 1983 to 1986), the median population of contiguous and noncontiguous counties declined during that time period.

profile includes all of the variables described above for 1958 through 1986 at five-year intervals. The year 1958 was selected as the starting point because it provides information for the region 10 years prior to completion of the interstate highways. The final year, 1986, is the last year for which data are available. Five-year intervals were used to show several periods of change.

Differences Among Interstate, Contiguous, and Noncontiguous Counties

The data for seven time periods (1958-86) are presented in table 1. A number of interesting patterns can be identified. For example, table 1 shows that interstate county populations were larger and had greater EBIs, retail sales, and BPIs than counties in the other two categories prior to construction of the interstate highway.[3] This pattern has been maintained through the 1958-86 time period. In addition, the populations of interstate counties are somewhat younger and have a higher percentage of persons aged 18-34 and a lower proportion aged 50 and older than the other counties.

It is interesting to note that, while the median population of the interstate counties grew during 1958-86 (although there was a slight dip from 1983 to 1986), the median population of contiguous and noncontiguous counties declined during that time period. While all three types of counties show increases in the key variables used in this analysis during 1958-86, disparities appear between interstate, contiguous and noncontiguous counties.

Table 1 - Key Variables Cross-Classified by Interstate Status for Nebraska and Iowa Counties, 1958-86*

Variable	Year						
	1958	1963	1968	1973	1978	1983	1986
	Interstate counties (n = 47)						
Population (number)	19,600	19,500	18,700	20,200	19,900	20,600	20,500
Households (number)	6,100	6,000	5,900	6,700	6,900	7,500	7,800
EBI (thousands of dollars)	28,927	32,772	47,873	74,005	121,694	168,789	214,633
Retail sales (thousands of dollars)	22,835	28,827	31,819	46,783	53,815	84,866	96,697
BPI	1.06	1.02	.992	.982	.834	.767	.711
Age 18-34 (percent)	NA	NA	NA	NA	24.600	26.900	25.700
Age 50+ (percent)	NA	NA	NA	NA	29.400	29.800	29.800
	Contiguous counties (n = 71)						
Population (number)	13,700	13,300	13,100	13,400	13,900	13,400	13,100
Households (number)	4,100	4,400	4,300	4,800	5,200	5,200	5,200
EBI (thousands of dollars)	19,179	21,769	31,603	47,599	73,602	112,220	135,567
Retail sales (thousands of dollars)	16,299	18,481	23,565	31,002	34,989	47,516	61,142
BPI	.718	.664	.658	.687	.579	.484	.462
Age 18-34 (percent)	NA	NA	NA	NA	21.800	23.900	23.100
Age 50+ (percent)	NA	NA	NA	NA	33.500	33.400	33.400
	Noncontiguous counties (n = 74)						
Population (number)	10,250	9,600	9,050	9,250	9,050	9,050	8,850
Households (number)	3,100	3,000	2,800	3,250	3,250	3,250	3,250
EBI (thousands of dollars)	14,456	14,474	20,425	28,294	43,689	59,892	72,361
Retail sales (thousands of dollars)	11,604	12,154	17,850	23,724	23,828	36,787	34,959
BPI	.527	.459	.452	.417	.347	.321	.265
Age 18-34 (percent)	NA	NA	NA	NA	20.200	23.200	22.400
Age 50+ (percent)	NA	NA	NA	NA	34.000	33.400	33.450

*All numbers are expressed as medians.

Table 2 shows ratios for the key variables that permit a relatively quick comparison of the trend for each variable for contiguous and noncontiguous counties relative to interstate counties. Each ratio is derived using the interstate county figure as a base. For example, the 1958 ratio for population in contiguous counties is 0.7 and was arrived at by dividing 13,700 (1958 population value for contiguous counties in table 1) by 19,600 (1958 population value for interstate counties). In other words, the median population size for contiguous counties is seventy percent that of interstate counties in 1958. By 1986, the median population size for contiguous counties was sixty-four percent of the median value for interstate counties.

In addition to showing that contiguous and noncontiguous counties have smaller populations and lower levels of economic activity than interstate counties, the ratios highlight several other patterns. One is the general continuum of economic performance, with economic performance being highest in the interstate counties and lowest in the noncontiguous counties.

Table 2 - Ratios for Key Variables in Nebraska and Iowa Counties, Relative to Interstate Counties, 1958-86*

Variable	Year 1958	1963	1968	1973	1978	1983	1986
				Contiguous counties			
Population	0.70	0.68	0.70	0.66	0.70	0.65	0.64
Households	.67	.67	.73	.72	.75	.69	.67
EBI	.66	.66	.66	.64	.60	.66	.63
Retail sales	.71	.64	.74	.66	.65	.56	.63
BPI	.68	.65	.66	.70	.69	.63	.65
Age 18-34 (percent)	NA	NA	NA	NA	.87	.89	.90
Age 50+ (percent)	NA	NA	NA	NA	1.14	1.12	1.12
				Noncontiguous counties			
Population	.52	.49	.48	.46	.45	.44	.43
Households	.51	.50	.47	.48	.47	.43	.42
EBI	.50	.44	.43	.38	.36	.35	.34
Retail sales	.51	.42	.56	.51	.44	.43	.36
BPI	.50	.45	.46	.42	.42	.42	.37
Age 18-34 (percent)	NA	NA	NA	NA	.82	.86	.87
Age 50+ (percent)	NA	NA	NA	NA	1.16	1.12	1.12

*The location of an interstate highway is used as a base for the ratios, which represent the contiguous county or noncontiguous county as a percentage of the interstate exchange counties.

The second pattern is a tenuous stability in the contiguous counties relative to interstate counties. Noncontiguous counties, on the other hand, experienced some erosion in performance relative to interstate counties during 1958-86.

Table 3 shows changes in population, EBI, and retail sales for two change periods (1958-68 and 1968-78) — the ten-year intervals before and after the completion of the interstate highway system. The ratios are expressed as the 1968 value divided by the 1958 value, and the 1978 value divided by the 1968 value. The 0.95 population value for interstate counties means that the 1968 median population for interstate counties is 95 percent of the 1958 median. The EBI value of 1.65 tells us that the 1968 EBI was 165 percent of the 1958 EBI.

These data show that noncontiguous counties lagged behind the performance of interstate counties, both before and after completion of the interstate. Contiguous counties performed much the same as interstate

Table 3 - Changes in Key Variables in Nebraska and Iowa Counties, 1958-78, Ten-Year Intervals

Type of county	1968 as a percentage of 1958 Population	EBI	Retail sales	1978 as a percentage of 1968 Population	EBI	Retail sales
Interstate	0.95	1.65	1.39	1.06	2.54	1.69
Contiguous	.96	1.65	1.45	1.06	2.33	1.48
Noncontiguous	.88	1.41	1.53	1.00	2.13	1.33

Noncontiguous counties lagged behind the performance of interstate counties, both before and after completion of the interstate. Contiguous counties performed much the same as interstate counties during 1958-68, but interstate counties substantially lead contiguous counties during 1968-78.

counties during 1958-68, but interstate counties substantially lead contiguous counties during 1968-78. The one area where noncontiguous counties' economic performance lead the other county types was in retail sales change for 1958-68. During this time, noncontiguous counties posted a growth rate of 153 percent, compared to change rates of 145 and 139 percent for contiguous and interstate counties, respectively. This pattern was reversed during 1968-78, when the rate of retail trade change for noncontiguous counties was the lowest of the three types of counties.

While the descriptive information shown in tables 1 through 3 suggests that interstate highways have fostered economic growth and slowed population decline in counties that contain interstates, no causal assertions can be made. The second part of the analysis provides a more formal test and focuses on cause-effect relationships.

Investigating Cause-Effect Relationships

Editor's note: Readers unfamiliar with regression analysis, the statistical technique this section relies on, can find a concise explanation of the technique in Susan Welch and John C. Comer's Quantitative Methods for Public Administration *(Homewood, IL: The Dorsey Press, 1983:180-232, esp. 209-210). Alternatively, readers may wish to move directly to "The Role of Population Size" (p. 16).*

The second data treatment uses multiple regression and specifies changes in EBI and retail sales as dependent variables in two separate equations. An equation for BPI is not included because this index includes population — a variable also used as an independent factor. Multiple regression is a statistical technique designed to predict levels of a dependent variable (for example, EBI) with levels of independent variables (for example, population size and interstate status). The dependent variable is seen as a linear function of the independent variables, with increases in, say, EBI, a function of one or more independent variables. Thus, one variable is regarded as

dependent on one or more other factors. The interval of change is 1963-86, a period starting before interstate completion (about 1969) and continuing through the last year for which data are available. The hypothesis is that for both dependent variables (EBI and retail sales), interstate status is a significant determinant of the percentage of economic growth for the 1963-86 period.

Changes in Effective Buying Income. Two multiple regression analyses were performed in order to assess the causal impact of interstate highways, relative to other factors, on economic growth. Table 4 shows the first equation, with the proportion change in EBI (from 1963 to 1986) as the dependent variable. The equation uses log population, percentage of population aged 18-34, and contiguity to the interstate as factors to predict changes in EBI that occurred during 1963-86.

The log of population is used to maintain a linear relationship among the variables. The 1963-86 period was chosen because it accounts for the latest year in which interstate highways were probably not a factor in economic growth (1963), and it includes the entire interval for which there are data. Age structure is drawn from the 1960 U.S. Census as a surrogate for the 1963 age structure.

Change in EBI, the dependent variable ([EBI 1986 - EBI 1963]/EBI 1963), was regressed on the other variables appearing in table 4. The first three independent variables — log of population, percentage of population 18-34 years of age, and percentage of population 50 years or older — control for structural conditions present at the beginning of the time interval. The two highway variables represent the effects of interstate highways and the potential spillover effect on contiguous counties. Other independent factors (for example, households) were excluded from the analysis because they were

Table 4 - Regression Equation for Change in EBI, 1963-86

Predictor variable	B	(Beta)	T	Significance
Log population, 1963	.271	(0.187)	.93	<.02
Percent population 18-34, 1960	.191	(.371)	3.72	<.001
Percent population 50+, 1960	.025	(.067)	.73	NS
D1 (Interstate)	.421	(.120)	1.50	NS
D2 (Contiguous)	.076	(.024)	.34	NS
Constant	-.131		-.08	NS

NS = Not a significant predictor.
Adjusted R square = 0.231; F = 12.46; $p < .001$.

During 1963-86 the presence of an interstate highway was not important to EBI growth. It is likely that pre-existing or other unmeasured factors fostered EBI increases.

so closely related to other variables included in the equation presented in table 4. As a result, they do not improve the ability to predict the dependent variable. Those factors with significance levels of <0.05 or <0.01 are statistically significant and are regarded as the most important predictors in the analysis.

The equation explains change in EBI only moderately well. About twenty-five percent of the variance in EBI change is explained by the five predictor variables listed in table 4. Except for percentage of population aged 50 and older, the effect of each variable is in the expected direction. In the case of population over 50 years of age, the direction of the relationship is positive — an older population is related to higher levels of EBI. However, only two variables have significant regression coefficients: log population ($p<.02$) and percentage of population aged 18-34 ($p<.001$). These two factors are most important in the first equation. In sum, these results show that during 1963-86 the presence of an interstate highway was not important to EBI growth. That is, it is likely that pre-existing or other unmeasured factors fostered EBI increases.

Changes in Retail Sales. Table 5 shows the results of a second regression equation for the same time interval, but here the dependent variable is

Table 5 - Regression Equation for Change in Retail Sales, 1963-86

Predictor variable	B	(Beta)	T	Significance
Log population, 1963	.044	(0.029)	0.40	NS
Percent population 18-34, 1960	.214	(.360)	4.04	<.001
Percent population 50+, 1960	-.002	(-.010)	-.058	NS
D1 (Interstate)	.659	(.179)	2.27	<.05
D2 (Contiguous)	-.103	(-.031)	-.45	NS
Constant	-1.37		-.77	NS

NS = Not a significant predictor.
Adjusted R square = 0.252; F = 13.89; $p < 0.001$.

Clearly, retail sales benefited from completion of the interstate highway.

change in retail sales. While the set of independent variables explains change in retail sales as well as it explains change in EBI, this equation is much different. While only two factors are once again statistically significant in this case, interstate highways have a marked effect on growth in retail sales. Overall, EBI is most affected by factors in place before construction of the interstate highways — population size, for example. Clearly, retail sales benefited from completion of the interstate highway.

The Role of Population Size

The third analysis examines interstate counties subdivided by size. The grouped counties are profiled as in the first analysis (three categories, all variables, 1958-86). Measures of change are computed for intervals consisting of preinterstate (1958-68) and postinterstate (1973-86). The purpose of this procedure is to test the assertion that interstate highways best benefit counties of at least a certain minimum size, because these counties can take advantage of the increased traffic and transportation convenience such highways offer. A county, then, must have a base number of retail stores, lending institutions, and other entities needed to absorb economic expansion.

While interstate highways are expected to have a positive overall effect on economic growth, their impact is expected to vary according to the size of the population in the county at the beginning of the interval. In other words, interstate counties with smaller populations will probably be less able to take advantage of the positive impact of the highway. To test this hypothesis, the 47 interstate counties were divided into three categories based on size of population in 1958. The three categories are 15,000 persons or less, 15,001-30,000, and 30,001 and more. These size categories conform roughly to size differentials used in previous analyses of highway-economic development linkages.

The economic measures and age data for the groupings are presented in table 6. As expected, EBI, retail sales, and BPI increase as county size increases. In addition, large counties have higher concentrations of younger persons (aged 18-34) and lower concentrations of older persons (aged 50 and older), suggesting a greater potential for continued economic growth.

Table 6 - Variables of Interest for Interstate Counties in Nebraska and Iowa, by Population Size, 1958-86*

Variable	Year						
	1958	1963	1968	1973	1978	1983	1986
	Population 15,000 or Less (n = 14)						
EBI (thousand dollars)	13,905	15,424	22,564	33,478	53,815	68,795	95,493
Retail sales (thousand dollars)	10,097	12,510	15,216	21,992	27,891	43,122	48,068
BPI	.526	.465	.442	.433	.413	.341	.324
Age 18-34 (percent)	NA	NA	NA	NA	22.50	24.55	23.70
Age 50+ (percent)	NA	NA	NA	NA	33.60	32.85	32.85
	Population 15,001-30,000 (n = 19)						
EBI (thousand dollars)	28,927	32,772	47,873	74,005	121,694	168,789	214,633
Retail sales (thousand dollars)	22,835	28,827	31,819	45,964	52,765	75,409	90,662
BPI	1.06	1.02	.992	.982	.834	.767	.711
Age 18-34 (percent)	NA	NA	NA	NA	23.50	25.50	24.60
Age 50+ (percent)	NA	NA	NA	NA	30.70	30.30	30.30
	Population 30,001 and more (n = 14)						
EBI (thousand dollars)	151,763	196,226	285,403	355,824	551,969	910,338	1,101,973
Retail sales (thousand dollars)	111,944	128,868	142,337	199,863	359,403	494,369	639,830
BPI	5.30	5.30	5.03	4.53	4.50	4.24	3.81
Age 18-34 (percent)	NA	NA	NA	NA	29.55	31.75	30.55
Age 50+ (percent)	NA	NA	NA	NA	24.05	24.40	24.30

*All numbers are expressed as medians.

Table 7 shows growth ratios (1986/1958) for interstate counties by size groupings. The 6.86 value for EBI in counties with 15,000 or fewer residents is translated as a 686 percent increase in EBI from 1958 to 1986. More populated interstate counties— even with their larger base figures— show greater EBI and retail sales increases while generating smaller BPI reductions. These differences are not likely to have occurred by chance.

Table 7 - Change Ratios (1986/1958) for Interstate Counties in Nebraska and Iowa

Variable	Population		
	15,000 or less (n = 14)	15,001-30,000 (n = 19)	30,001 and more (n = 14)
EBI*	6.86	7.41	7.26
Retail sales	4.76	3.97	5.71
BPI*	.62	.67	.72

*Statistically significant at the .01 level.

A critical mass of social and economic structure is required to take full advantage of the opportunities that interstate highways offer.

Table 8 shows growth during the 1973-86 period (after completion of the interstate highways). More dramatic EBI and retail sales differentials can be seen, along with a smaller BPI reduction, although counties with 15,001-30,000 residents do no better than small counties. When comparing large interstate counties with small interstate counties, the growth edge that large counties had during 1973-86 was 310 compared to 285 percent for EBI, 320 compared to 218 percent for retail sales, and 84 compared to 75 percent for BPI. These data support the assertion that a critical mass of social and economic structure is required to take full advantage of the opportunities that interstate highways offer.

Table 8 - Change Ratios (1986/1973) for Interstate Counties in Nebraska and Iowa

Variable	Population		
	15,000 or less (n = 14)	15,001-30,000 (n = 19)	30,001 and more (n = 14)
EBI*	2.85	2.90	3.10
Retail sales	2.18	1.98	3.20
BPI*	.75	.72	.84

*Statistically significant at the .01 level.

Policy Implications

The key issues focused upon in this chapter concern the role of interstate highways in the economic growth of counties in Nebraska and Iowa. While the descriptive analysis indicates substantial differences in performance, and one regression analysis indicates a significant interstate highway effect, the impact is clearly greater in more populous counties. This point is important given the passage of LB 632 by the Nebraska legislature. In sections 23 and 24 of this bill, ". . . the development of a system of expressways, which shall include, but not be limited to, a north-south expressway . . ." is identified. Factors to be considered in locating the road include economic development

needs and projected demographic trends. During 1988, numerous newspaper articles have indicated that Nebraskans are lobbying to have the expressway go through their towns.

Factors to Consider in Locating a North-South Expressway

Connect Major Population Points. Before siting the north-south expressway, three factors must be considered. First, the cities and towns that the highway will connect should be identified clearly. The U.S. interstate system was designed to connect major population centers. Segments originate and terminate at these centers. It is unrealistic to assume that a north-south expressway in Nebraska will carry requisite traffic flows if there are no destination points of interest to travelers and shippers. An extension of State Highway 281, for example, ends at St. Francis Lake in South Dakota, which may not be a point of interest to many travelers or freight carriers. Even the notion of a quick intersection with Interstate 90 in South Dakota does not seem to warrant expansion of an existing highway. Using existing highways and changing their direction is an option that should be considered.

It is unrealistic to assume that a north-south expressway in Nebraska will carry requisite traffic flows if there are no destination points of interest to travelers and shippers.

Locate Along Corridors Where Population is Largest. The second factor to be considered is the impact that an interstate highway would have on economic development. Carrying forward the argument that a county must have at least a threshold population of possibly 30,000 to benefit from an interstate highway, it is unlikely that many counties in Nebraska would benefit from such construction. Three north-south highways in Nebraska which could be upgraded to expressway status, and the counties in which they are located, are listed in table 9. Most of these counties do not contain populations large enough to realize the advantages of the economic growth opportunities which a four-lane expressway might make possible. Of the twenty-three counties listed, only five (twenty-two percent) have a population of 30,000 or more. Along Highway 81, only two counties have a population of 30,000 or more. Just as important, however, is the large number of counties with populations of less than 10,000 (fourteen, or sixty-one percent). Presently, many of these counties are experiencing population loss and population aging, both of which further exacerbate the problem of

Carrying forward the argument that a county must have at least a threshold population of possibly 30,000 to benefit from an interstate highway, it is unlikely that many counties in Nebraska would benefit from such construction.

Table 9 - Counties Intersected by Potential Expansion Highways, Nebraska, 1988

Highway 81		Highway 281		Highway 83	
County	Population	County	Population	County	Population
Thayer	7,500	Webster	4,700	Cherry	6,900
Fillmore	7,700	Adams	30,300	Thomas	1,000
York	15,000	Hall	50,100	Logan	1,000
Polk	6,100	Howard	6,800	Lincoln	35,100
Butler	9,200	Greeley	3,400	Frontier	3,600
Platte	30,000	Wheeler	1,000	Red Willow	12,900
Madison	33,600	Holt	14,000		
Pierce	8,500	Boyd	3,300		
Cedar	11,100				

development. These data indicate that the prospects for economic growth in many of the counties potentially affected by highway expansion are not good.

Consider the Difference Between Interstates and Limited Access Highways. Finally, the differences between interstate highways and limited access highways must be considered. Traffic flows on an interstate highway are unimpeded, even in metropolitan areas. The consistency of flow has made the interstate highway system highly attractive. Limited access highways (or expressways) as proposed in LB 632 do not provide for this consistency of flow. In fact, the three highways identified (81, 281, and 83) bisect many communities. The remitting flow is restricted on limited access highways, and the advantages of expressways are not comparable to those of interstate highways. Therefore, the economic growth dynamics might not be consistent with the findings here.

While some counties would benefit from such expansion, at least through the jobs created during the construction phase of the project, the overall long-term benefits to the state and the communities in terms of economic growth and development are likely to be disappointing.

Given the uncertainty about location of the highway expansion, along with the poor prospects for economic development of many of the counties potentially affected, the decision to expand any highway must be carefully assessed at this time. While some counties would benefit from such expansion, at least through the jobs created during the construction phase of the project, the overall long-term benefits to the state and the communities in terms of economic growth and development are likely to be disappointing.

Interstate Versus Limited Access Highways

Carefully and deliberately planned, a north-south interstate highway in Nebraska could be of substantial significance to the economic future of the communities through which it passes and which it connects. The findings presented in this chapter indicate that the interstate highways of Nebraska and Iowa have improved the counties with exchanges. The interstate highways provide an advantage in the drive toward economic improvement.

It must be understood that the economic gains that have been realized in Nebraska and Iowa have been associated with *interstate highway completions.* The proposed highway construction in Nebraska is for a *limited access highway.* While there are no direct measures of the economic gains associated with a limited access highway in this chapter, one suggestion is that a new north-south expressway should follow the same conceptual foundations associated with the interstate system to realize the greatest economic gains.

Construction of a limited access highway may not yield economic gains equivalent to those that would be realized with the construction of an interstate highway. If a decision is made to complete a limited access highway, this segment should reflect as many of the characteristics of an interstate system as possible. Certainly it should be associated with the counties with the largest population, with careful consideration toward meeting the threshold of 30,000. Furthermore, it should connect major population centers in order to maximize commercial and personal travel between these cities. Likewise,

this limited access highway should circumvent (rather than bisect) communities but also provide exchanges to them.

Highway construction could become the centerpiece of an economic development program for the state of Nebraska. First, significant economic improvement would be realized through the activities of construction. This highway also would provide access and allow progress in counties and communities that currently do not share the advantages of an interstate system. In turn, this would make the region more attractive for investment and industrial development and would improve community living.

If a decision is made to complete a limited access highway, this segment should reflect as many of the characteristics of an interstate system as possible.

Highway development should also enable the state legislature to identify and focus on communities which would be designated for economic support and growth. Focusing state investments, projects, and regional offices into these communities would encourage their growth and improve their economic performance (Deichert and Smith 1988). An important factor here is that a state policy of four-lane highway construction should be followed by the development of additional state policies and projects that would complement the investments.

Endnotes

1. Effective buying income (EBI) = total county personal income less personal tax and nontax payments. Retail sales = net sales minus refunds and allowances for returns for establishments engaged primarily in retail trade. Buying power index (BPI) = a weighted index that combines retail sales, total population, and EBI and expresses it as a percentage of the U.S./Canada potential to buy. It is calculated by giving a weight of five to the county's percentage of U.S./Canada EBI, three to its percentage of retail sales, and two to its percentage of population. The total of the weighted percentages is divided by 10 to produce the BPI.

2. Population = total county population. Households = number of county households. Percent population 18-34 = percent of county population aged 18-34 years. Percent population 50+ = percent of county population aged 50 years and older. Interstate county = a county with an interstate highway and an interstate exchange completed about 1970. Highway 218 in Iowa is not an interstate highway, but it has interstate characteristics and was classified as one. Forty-seven Nebraska and Iowa counties met this classification. Contiguous county = a county contiguous to a county containing an interstate highway exchange but with none itself. Seventy-one Nebraska and Iowa counties met this classification. Noncontiguous county = a county neither containing an interstate highway nor contiguous to a county containing an interstate exchange. Seventy-four Nebraska and Iowa counties met this classification.

3. BPIs are multiplied by 100 for comparison purposes.

References

Bardwell, George E., and Paul R. Merry. "Measuring the Economic Impact of a Limited-Access Highway on Communities, Land Use, and Land Value." *HRB Bulletin* 268, 1960.

Briggs, R. "Interstate Highway System and Development in Nonmetropolitan Areas." *Transportation Research Record 812*, TRB National Research Council, Washington, 1981, 9-12.

Deen, R. C. "Impact of I75 on the Local Economy Between Walton and Georgetown." *Research Report 244*, Division of Research, Department of Highways, Commonwealth of Kentucky, February 1966.

Deichert, Jerome A., and Russell L. Smith. "Growth Center Strategies for Rural Community Development." In Center for Applied Urban Research, *Symposium Proceedings: 1987 Nebraska Legislative Issues Symposium*. Omaha: University of Nebraska at Omaha, 1988.

Farmer, Joseph T., and Jerry G. Pigman. "Before Evaluation of Economic Growth Center Developmental Highway." *Research Report 395*, Division of Research, Bureau of Highways, Department of Transportation, Commonwealth of Kentucky, 1974.

Moon, Henry E., Jr. "Interstate Highway Interchanges Reshape Rural Communities." *Rural Development Perspectives* U.S. Department of Agriculture, Washington, (October 1987):35-38.

Stephanedes, Yorgos J. *Influence of Transportation on Economic Development*. Department of Civil and Mineral Engineering, University of Minnesota, 1985.

Stephanedes, Yorgos J., and David Eagle. "Highway Impacts on Regional Employment." *Journal of Advanced Transportation* 21(1987):67-79.

"Survey of Buying Power." *Sales & Marketing Management* 1958, 1963, 1968, 1973, 1978, 1983, 1986.

Wang, Pai-kang, George L. Peterson, and Joseph L. Schofer. "Population Change: An Indicator of Freeway Impact." *Transportation Engineering Journal* (August 1975):491-504.

Wilson, F. R., G. M. Graham, and Mohamed Aboul-Ela. "Highway Investment as a Regional Development Policy Tool." *Transportation Research Record 1046*, TRB, National Research Council, Washington, 1985, 10-14.